Feb. 6, 1962 L. WENCZLER 3,019,728

PRINTING PRESS MACHINERY

Filed March 25, 1960 2 Sheets-Sheet 1

Fig. 1.

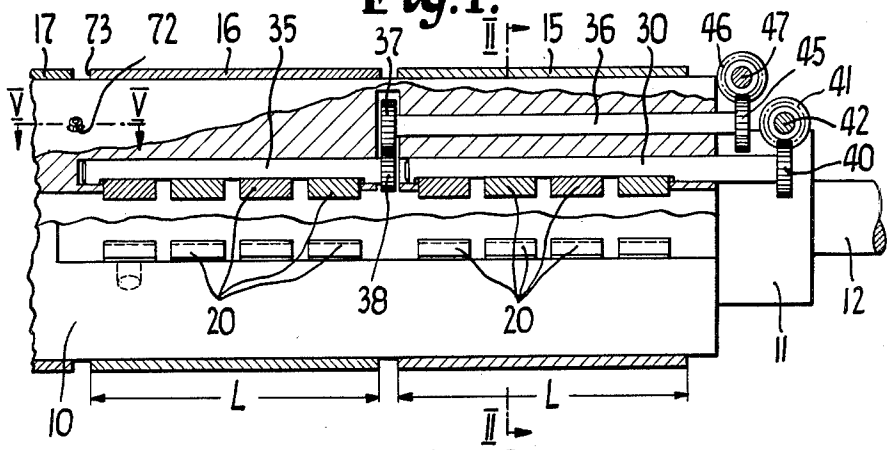


Fig. 2.

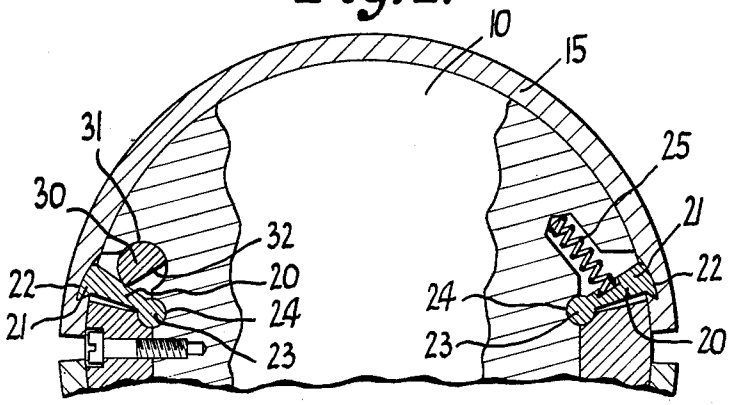


Fig. 5.

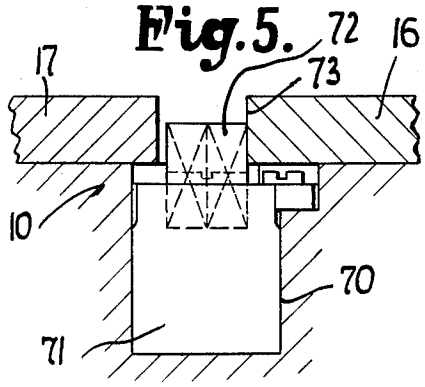
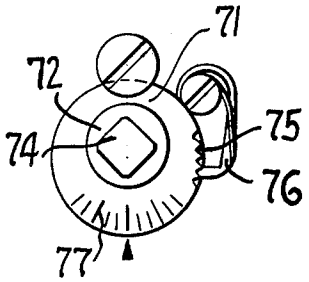


Fig. 6.



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Fig. 4.

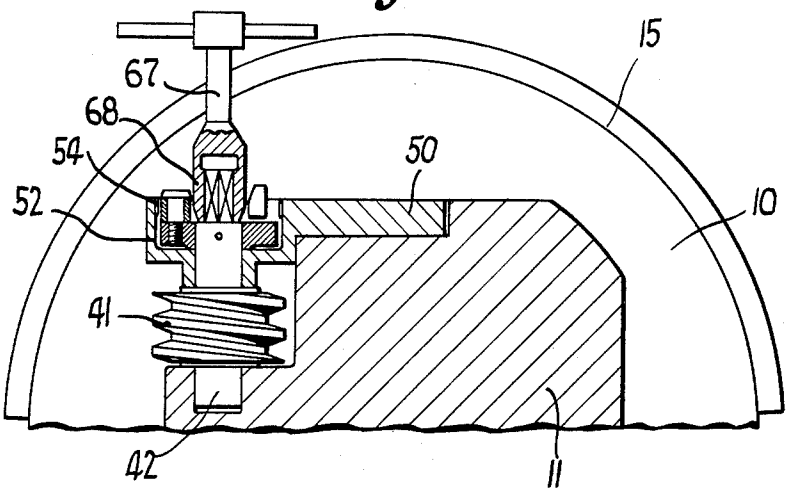
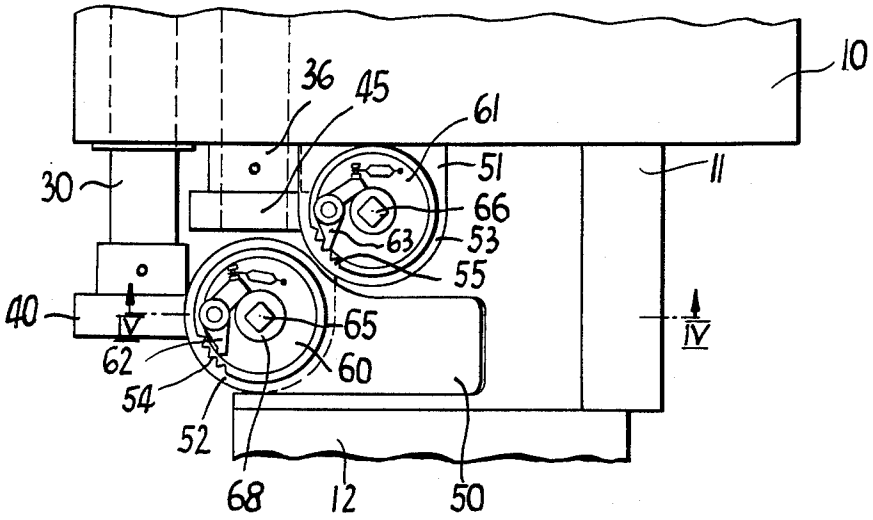


Fig. 3.



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3,019,728

PRINTING PRESS MACHINERY

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Filed Mar. 25, 1960, Ser. No. 17,563
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9 Claims. (Cl. 101—378)

This invention relates to apparatus and devices for the clamping of printing plates, such as stereotype plate and the like, onto the plate cylinders of rotary printing presses and, more particularly, to apparatus for such clamping by means of movable clamping hooks mounted in the plate cylinder for engaging recesses on the under side of the printing plates and operated, separately for each plate across the plate cylinder, by a shaft and gearing arrangement accessible at the end of the plate cylinder.

As is well known, in the mounting or clamping of printing plates, such as stereotype plates and the like, onto the surface of the printing cylinders of rotary printing presses, it may be desired to have such plates held firmly onto the cylinder by clamping means wholly beneath or covered by the plates so that the outer printing surface of the plated cylinder is not interrupted by clamping devices, particularly in web-fed continuous printing presses, and also so that the plates are held firmly onto the plate cylinders against the inevitable play of centrifugal forces present with high speed printing and despite some flexing or stretching which may be inherent in the particular material from which the plates are made.

If it is attempted to accomplish the foregoing by an arrangement of movable hooks rotatably or pivotally mounted within the plate cylinder on a shaft extending across the entire cylinder, some difficulties may be experienced in obtaining a firm and uniform clamping pressure of the hooks clear across the cylinder due to torsional effects on the shaft on which the hooks are pivotally mounted, and particularly in wider presses. Similarly, particularly with high speed presses of substantial width, the considerable weight of type-metal stereotype plates may, indeed, accentuate such non-uniformity of clamping under high centrifugal forces to which such plates are subjected in use, with substantial damage, or at least down time, resulting from such loosening, and, particularly in situations where a number of different (and, hence, dimensionally varying) separate printing plates are to be mounted across or around a plate cylinder on the press.

Similarly, if it is attempted to compensate for the foregoing situations by individually mounting the several clamping means pivotally within the cylinder for operation into clamping position by a separate camming action from the end of the cylinder, difficulty may be experienced, particularly with plate cylinders along which a plurality of adjacent printing plates are to be positioned, in the situation where only the clamping means for one of several plates is desired to be operated without also opening or closing the clamping means for other adjacent plates. Thus an advantageous clamping arrangement is disclosed in the copending application of Paul Dietrich, Serial No. 775,487, filed November 21, 1958, but without provision for separately operating a plurality of coaxially arranged clamping devices as may be desired with a plate cylinder along which a plurality of printing plates are to be positioned in substantially exact axial alignment.

According to this invention, however, a firm and uniform clamping of a plurality of printing plates, such as stereotype plates and the like, across the plate cylinder of a rotary printing press is achieved by providing, mounted in the plate cylinder, a plurality of swingable hooks for engaging a recess on the under side of each printing plate

to be mounted along the cylinder, with the hooks for engaging each separate plate being forced into clamping position by the cam action of a rotating member or shaft, and with the clamping hooks for each plate along the plate cylinder being operated by a separate camming member or shaft extending along the cylinder for the longitudinal extent of each separate plate. As a further feature of this invention, all said separate rotating camming members or shafts are operable for moving each of said plurality of hooks for each of said printing plates into clamping position by an operating means accessible at one end or the other of the plate cylinder, and notwithstanding the fact that each of said camming members or shafts extends longitudinally of said cylinder substantially only to the axial extent of its respective printing plate on said cylinder, the operation of those of said shafts or camming members effective upon clamping hooks for printing plates axially spaced along said cylinder from either end thereof being effected through a jack-shaft and gear train arrangement operationally accessible from one end of said cylinder as readily as the camming mechanism or shaft for a plate adjacent said end of said cylinder is accessible to the operator of the printing press.

One object of this invention is to provide means for clamping opposite axial edges of printing plates and the like to the plate cylinder of the rotary printing press with the torsion-resisting operation of a camming of a plurality of clamping members (as disclosed in the afore-mentioned copending application) but with separate control of the camming or clamping forces of said hooks individually for a plurality of printing plates mounted along said plate cylinder.

Another object of this invention is to provide means of the character described for separately controlling the camming action for moving a plurality of clamping members into clamping position with regard to a plurality of different printing plates mounted along and around a plate cylinder of a rotary printing press, and for separately operating each of said means from a readily accessible position to an end of said printing cylinder axially beyond the area covered by any or all of said separate printing plates.

A further object of this invention is to provide, in a combination of the character described for application to printing machinery, additional means for adjusting and controlling the axial positioning of the plurality of printing plates on a plate cylinder of the printing press, such axially positioning means being disposed on or in said cylinder so as to be accessible and functioning independently of clamping means in said cylinder for individually clamping the axial edges of a plurality of printing plates thereon.

Other objects and advantages of this invention will be apparent from the following description, the accompanying drawings, and the appended claims.

In the drawings:

FIG. 1 is a view, partially in axial section of a portion of a printing press plate cylinder embodying this invention and showing a portion of such a cylinder at one end thereof;

FIG. 2 is a partial transverse section along the line II—II of FIG. 1;

FIG. 3 is a partial plan view on a somewhat larger scale of the right-hand end portion of FIG. 1;

FIG. 4 is a partial transverse section along the line IV—IV of FIG. 3;

FIG. 5 is a partial transverse section along the line V—V of FIG. 1; and

FIG. 6 is a partial detail top plan view of the mechanism shown in FIG. 5.

Referring to the drawings, in which like characters of reference refer to like parts throughout the several

views thereof, a portion of a printing press plate cylinder having the invention applied thereto is indicated in FIG. 1, it being understood that only a portion of the cylinder at one end thereof is shown and that a hub, etc., arrangement is provided at the other end of the cylinder in a manner well understood in this art. As illustrated, a plate cylinder **10** is provided, having a conventional end **11** and hub or boss **12**, for accommodating a plurality of printing plates or stereotype plates **15**, **16**, etc., clamped around and along cylinder **10**, which plates, for purposes of illustration, are indicated as having an axial dimension L along cylinder **10**.

As indicated more particularly in FIG. 2, the plates **15**, **16**, etc., may have, as is well known, a circumferential extent of somewhat less than half the circumference of cylinder **10**, and are secured therearound by a plurality of clamping hooks or members **20** having barbed radially outer edges **21** for engaging in slots **22** along opposite axial edges of the under side of plates **15**, **16**, etc. Clamps **20** are mounted in cylinder **10** for pivoted or swinging movement with respect to slots **22**, such mounting in the illustrated embodiment being provided by a generally cylindrical portion **23** on clamps **20** engaged in a generally cylindrical slot **24** extending axially within cylinder **10**—generally an arrangement of the character disclosed in the above mentioned copending application.

As noted in FIG. 1, there is, preferably, a plurality of clamps **20** for engaging each edge of plates **15**, **16**, etc., and spaced axially therealong. As indicated in FIG. 2, those of the clamps **20** which engage one edge of plates **15**, **16**, etc. (at the right side of FIG. 2), are preferably urged into the clamping or locking position shown by resilient means such as springs **25** to accommodate, for example, any stretching or flexing of the plates which may occur particularly at high speed operation, while still maintaining a firm clamping engagement thereof to the plate cylinder **10**. The other clamps **20** which engage the opposite edge of the plate **15**, **16**, etc. (at the left side of FIG. 2), are positively moved into the clamping position illustrated by rotation of an axially extending cam shaft **30** rotatably mounted as in a cylindrical channel **31** extending axially in cylinder **10**.

Cam shaft **30** has an axial flat **32** therealong, and, as will be apparent from the foregoing, rotation of shaft **30** into the position shown in FIG. 2 cams the associated clamps **20** into the clamping position shown with respect to slot **22** in the under side of plate **15**; while rotation of shaft **30** clockwise in the drawing, to bring flat **32** adjacent the surface of the clamps **20**, permits the clamps to swing out of clamping position about the cylindrical pivot portions **23** thereon. Also, as noted, the use of such camming action of shaft **30**, which is preferably spaced radially outwardly of the axis of the pivoting of the clamps **20** at **23**, permits a firm and positive uniform clamping or closing force on each of the several clamps **20** spaced along the edge of plate **15** and substantially free of twisting or torsional non-uniformity which might occur if it were attempted to apply the entire clamping force through a shaft on which the plurality of clamps **20** were mounted at the pivot axis thereof.

As indicated in FIG. 1, it is desired to have the clamps **20** for each plate **15** or **16** independently operable, and so, as indicated in FIG. 1, cam shaft **30** extends axially of cylinder **10**, from a point accessible at the end of this cylinder for operation of cam shaft **30** by a mechanism described below, only so far as is required to operate all of the clamps **20** associated with one edge of plate **15**. For the operation of those of the clamps **20** associated with one edge of a different plate **16**, a separate cam shaft **35** is provided axially within cylinder **10** and extending axially thereof substantially only through the extent of cylinder **10** overlaid by plate **16**. As will be understood from the foregoing, cam shaft **35** is positioned coaxially with cam shaft **30** in cylinder **10** and operates with respect to those of the clamps **20** associated with it in the same manner as indicated in FIG. 2 for cam shaft **30**—although the actual mechanism for rotating shaft **35** from the point accessible from the end of the cylinder is somewhat different, as described below, and includes a jack shaft **36** rotatably mounted axially in cylinder **10** and extending from the end of cylinder **10** past cam shaft **35**, as by means of gears **37** and **38**, so that rotation of jack shaft **36** will produce rotation of cam shaft **35**.

As noted above it is desired to provide means for operating cam shafts **30** and **35** and accessible from the end of the plate cylinder (i.e., from the side of the printing press) and outside that area of the plate cylinder surface to be covered by printing plates. In the illustrated embodiment, cam shaft **30**, associated with plate **15** adjacent one end of plate cylinder **10**, is provided with a worm gear **40** meshing with a worm **41** mounted on a shaft **42**, whereby rotation of worm **41** will cause corresponding rotation of cam shaft **30**. A similar arrangement is provided for rotation of jack shaft **36** and cam shaft **35** by worm gear **45** on jack shaft **36** meshing with worm **46** on shaft **47**. Since cam shaft **35** is spaced from the end of cylinder **10**, it may be desired to include some mechanical advantage or power-increasing ratio for the operating arrangement as, for example, in the gearing **37**—**38** between jack shaft **36** and cam shaft **35**.

As illustrated in FIGS. 3 and 4, worms **41** and **46** and the shafts **42** and **47** therefor are mounted for rotation in the end portion **11** of cylinder **10** as by brackets **50** and **51**, respectively. Brackets **50** and **51** also include annular members **52** and **53**, respectively, each of which has on the inner surface thereof ratchet teeth indicated at **54** and **55**, respectively. Ratchet wheels **60** and **61** are mounted on shafts **42** and **47**, respectively, for rotation with worms **41** and **46**, and these ratchet wheels carry pivoted spring-loaded pawls **62** and **63** for engaging, respectively, the ratchet teeth **54** and **55** to lock worms **41** and **46** (and, hence, cam shafts **30** and **35**) in any particular angular position in which they may be placed. The outer ends of worm shafts **42** and **47** have means for receiving a wrench thereon, such as the squared portions **65** and **66** for receiving a socket wrench **67** with which the desired rotation of cam shafts **30** and **35** is manually achieved. In the illustrated embodiment, wrench **67** has a bevelled and enlarged base socket portion **68** of such size and configuration that, when wrench **67** is placed upon either of the squared ends **65** or **66**, the base **68** will engage the respective pawl **62** or **63** and move it out of engagement with the ratchet teeth **54** or **55** (the two positions of the pawls being illustrated in FIG. 3).

As will be apparent from the foregoing, rotation of the cam shafts **30**, **35**, etc., is individually obtained, to move clamps **20** into or out of clamping engagement with plates **15**, **16**, etc., and from a readily accessible point at the end of plate cylinder **10**; while the pawl-and-ratchet arrangements lock cam shafts **30**, **35**, etc., into any angular positioning—as desired for register-cylinders of multicolor printing—thereby locking clamps **20** into any of a variety of clamping positions for providing the desired individual clamping force on plates **15**, **16**, etc., despite dimensional variations which may occur among the printing plates.

There is also provided, in accordance herewith, means for adjusting the axial positioning of the plates, for precisely and minutely controlling the register of the printed image, and, preferably, such means are positioned in cylinder **10** so as to be accessible when plates **15**, **16**, etc., are in place on cylinder **10**—e.g., with the operating mechanism for the axial adjustment being positioned on cylinder **10** so as to be accessible in the small space between adjacent printing plates.

As indicated in the drawings, and particularly FIGS. 5 and 6, such means include, in the illustrated embodiment, radially extending borings **70** in cylinder **10** and

positioned axially thereof generally between axially adjacent plates. Into borings **70** are inserted rotatable cylindrical plugs **71**, each of which has at the radially outer end thereof an upstanding circular bearing portion **72** protruding radially upwardly from the surface of cylinder **10** and arranged on plug **71** eccentrically with respect to the axis thereof. The diameter of bearing portion **72** and the extent of eccentricity thereof are both correlated so that portion **72** bears against the circumferential edge **73** of, for example, plate **16**, whereby rotating plug **71** and eccentric portion **72** thereon will force plate **16** axially of cylinder **10**.

Means, such as a square socket **74** in bearing **72**, are provided for receiving an Allen wrench for rotating plug **71** and eccentric bearing **72**. Also, as indicated in FIG. 6, ratchet teeth **75** are provided around the outside of plug **71** for engagement by a pawl **76** mounted in cylinder **10** to lock plug **71** in any particular angular positioning. If desired, there is provided on the top surface of plug **71** a scale indicated at **77** and visible through the space between adjacent plates whereby the extent of axial shifting of the plates in various angular positions of bearing **72** may be noted or pre-set.

It is to be understood that, for simplification of the showings in the drawings, only one axial adjustment device is shown and that the clamping mechanism for only two adjacent plates **15** and **16** has been shown. Thus, the axial displacement mechanism indicated in FIGS. 5 and 6 is repeated for the various printing plates. Similarly, the clamping arrangements and the means for the operation thereof are also duplicated for plates in addition to **15** and **16**, depending upon the total number of plates to be accommodated on plate cylinder **10**. Such duplication may, as desired, be at the end of the plate cylinder opposite to that illustrated in FIG. 1 and/or in such other manner, preferably, so as to maintain circular symmetry of the weight or mass of material to be rotated with cylinder **10**.

As will be apparent from the foregoing illustrative explanation of a structure embodying and for practicing this invention, positive clamping of one axial edge of printing plates **15**, **16**, etc., to plate cylinder **10** is achieved by positively urging clamps **20** into clamping position by rotation of cam shafts **30** and **35**, while resilient clamping of the opposite axial edges of the plates is achieved with spring means **25**. Moreover, the operation of those of the clamps **20** associated with a particular printing plate is separately achieved by the individual operation of the several cam shafts **30**, **35**, etc. Similarly, the operation of all the cam shafts is achieved from operating means positioned and accessible at the end of cylinder **10**, notwithstanding that one or more of such cam shaft are in the central portion of cylinder **10** and substantially removed from either end thereof. The foregoing advantages are achieved while still permitting coaxial alignment of cam shafts **30** and **35** through the cylinder **10** and, also, coaxial alignment of the pivot axis of clamps **20** for uniform spacing and alignment of the axial edges of a plurality of printing plates along cylinder **10**. There is also provided, as will be understood from the foregoing, means for axially or laterally adjusting printing plates with respect to cylinder **10**, which means are provided in a manner visually and manually accessible even when the printing plates are on the cylinder and without interference with the operating means for the clamping of axial edges of the plates to the cylinder.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to these precise methods or forms of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. In a device for clamping stereotype printing plates and the like onto the plate cylinder of a rotary printing press where at least some of said stereotype plates are spaced axially of said cylinder from either end thereof, the combination which comprises a separate set of clamping hooks for clamping engagement with opposite axial edges of each of said plates, means for mounting said clamping hooks in said plate cylinder for clamping each individual printing plate, and individual operating means accessible at one end of said plate cylinder for separately and individually operating said clamping means for a plurality of said sets of clamping hooks which are axially aligned along said cylinder and for clamping edges of plates axially aligned therealong.

2. In a device for clamping stereotype printing plates and the like onto the plate cylinder of a rotary printing press where at least some of said stereotype plates are spaced axially of said cylinder from either end thereof, the combination which comprises a separate set of clamping hooks for clamping engagement with opposite axial edges of each of said plates, means for pivotally mounting said clamping hooks in said plate cylinder for arcuate swinging movement of said hooks selectively into and out of clamping engagement with said plates, rotatable cam means for swinging independently separate said sets of hooks for clamping one edge of said individual printing plates, and individual operating means accessible at one end of said plate cylinder for separately and individually operating said cam means for each of said sets of clamping hooks, some of said cam means for clamping said edges of plates spaced axially from said end of said cylinder being co-axially aligned with those of said cam means for clamping said edges of plates nearer said end of said cylinder.

3. In a device for clamping stereotype printing plates and the like onto the plate cylinder of a rotary printing press where at least some of said stereotype plates are spaced axially of said cylinder from either end thereof, the combination which comprises a separate set of clamping hooks for clamping engagement with opposite axial edges of each of said plates, means for pivotally mounting said clamping hooks in said plate cylinder for arcuate swinging movement of said hooks selectively into and out of clamping engagement with said plates, rotatable cam means for swinging independently separate said sets of hooks for clamping one edge of said individual printing plates, and individual operating means accessible at one end of said plate cylinder for separately and individually operating said cam means, said operating means including separate gear trains for rotating each of said rotatable cam means, and at least some of said rotatable cam means being co-axially aligned in said cylinder with others of said cam means.

4. A device as recited in claim 2 in which spring means are provided for urging into clamping position those of said clamping hooks clamping said edges of said plates opposite to said edges clamped by said sets of hooks operated by said rotatable cam means.

5. A device as recited in claim 3 in which said operating means and gear train for operating those of said rotatable cam means co-axially aligned with other said cam means but spaced inwardly from said end of said cylinder include a jack shaft and gearing engaging said inwardly spaced cam means and means for rotating said jack shaft accessible from said end of said cylinder effecting rotation of said cam means notwithstanding said spacing thereof from said end of said cylinder and said co-axial alignment thereof with said other cam means nearer said end of said cylinder.

6. A device as recited in claim 5 in which said operating means and gear trains for said various cam means for operating said sets of clamping hooks include a rotatable worm meshing with a worm gear on one of said rotatable cam means adjacent said end of said cylinder for rotation of said cam means and another worm meshing with a worm gear on said jack shaft for rotating another co-

axially aligned cam means spaced inwardly from said end of said cylinder.

7. A device as recited in claim 2 in which said individual operating means for operating said cam means include separate pawl-and-ratchet means associated therewith for maintaining each of said rotatable cam means in a particular angular positioning and means operating said operating means with a manually rotated wrench applied thereto and including means for disengaging said pawl from said ratchet upon application of said wrench permitting rotation of said operating means in either direction of rotation.

8. A device as recited in claim 1 in which there is also included an eccentrically rotatable bearing abutment effective on a circumferential edge of said printing plates for

lateral adjustment thereof axially of said cylinder upon rotation of said eccentric bearing abutment.

9. A device as recited in claim 8 in which said eccentric bearing abutment includes pawl-and-ratchet means for maintaining said abutment in a particular angular positioning with respect to the bearing of said eccentric abutment on said circumferential edges of said plates.

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